In the Claims:

Please amend the claims as follows.

The following lists all claims and their status:

Claims 1-1882 (cancelled)

1883. (previously amended) A method of treating a hydrocarbon containing formation in situ, comprising:

providing heat from one or more heaters to at least a portion of the formation;

allowing the heat to transfer from one or more heaters to a part of the formation;

wherein the part of the formation has been selected for heating using an atomic hydrogen to carbon ratio of at least a portion of hydrocarbons in the part of the formation, wherein at least a portion of the hydrocarbons in the part of the formation comprises an atomic hydrogen to carbon ratio greater than about 0.70, and wherein the atomic hydrogen to carbon ratio is less than about 1.65; and

producing a mixture from the formation.

1884. (previously amended) The method of claim 1883, wherein the one or more heaters comprise at least two heaters, and wherein controlled superposition of heat from at least two heaters pyrolyzes at least some hydrocarbons within the part of the formation.

1885. (previously amended) The method of claim 1883, further comprising maintaining a temperature within the part of the formation within a pyrolysis temperature range.

1886. (currently amended) The method of claim 1883, wherein at least one of the one or more ~~of the~~ heaters ~~comprise~~ comprises an electrical ~~heaters~~heater.

1887. (cancelled)

1888. (currently amended) The method of claim 1883, wherein at least one of the one or more ~~of the~~ heaters ~~comprise~~ comprises a flameless distributed ~~combustors~~combustor.

1889. (currently amended) The method of claim 1883, wherein at least one of the one or more ~~of the~~ heaters ~~comprise~~ comprises a natural distributed ~~combustors~~combustor.

1890. (previously amended) The method of claim 1883, further comprising controlling a pressure and a temperature within at least a majority of the part of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1891. (previously amended) The method of claim 1883, wherein allowing the heat to transfer from the portion of the formation to a part of the formation comprises pyrolyzing hydrocarbons within the part of the formation, and further comprising controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day during pyrolysis.

1892. (currently amended) The method of claim 1883, wherein providing heat from the one or more ~~of the~~ heaters to at least the portion of the formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from one or more of the heaters, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day (Pwr) provided to the selected volume is equal to or less than $h*V*Cv*\rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

1893. (original) The method of claim 1883, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1894. (currently amended) The method of claim 1883, wherein providing heat from one or

more of the heaters comprises heating the part of the formation ~~such that~~ to increase a thermal conductivity of at least a portion of the part of the formation ~~is~~ to greater than about 0.5 W/(m °C).

1895. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1896. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1897. (original) The method of claim 1883, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1898. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1899. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1900. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1901. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the

condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1902. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1903. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1904. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1905. (original) The method of claim 1883, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1906. (previously amended) The method of claim 1883, wherein the produced mixture comprises a non-condensable component that does not condense at 25 °C and one atmosphere absolute pressure, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1907. (original) The method of claim 1883, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1908. (original) The method of claim 1883, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1909. (previously amended) The method of claim 1883, further comprising controlling a pressure within at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1910. (original) The method of claim 1883, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1911. (original) The method of claim 1910, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1912. (original) The method of claim 1883, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1913. (original) The method of claim 1883, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1914. (previously amended) The method of claim 1883, further comprising:

providing hydrogen (H_2) to the heated part of the formation to hydrogenate hydrocarbons within the part of the formation; and

heating a portion of the part of the formation with heat from hydrogenation.

1915. (original) The method of claim 1883, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1916. (currently amended) The method of claim 1883, wherein allowing the heat to transfer

~~comprises increasing~~increases a permeability of a majority of the part of the formation to greater than about 100 millidarcy.

1917. (currently amended) The method of claim 1883, wherein allowing the heat to transfer ~~comprises substantially uniformly increasing~~increases a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform.

1918. (original) The method of claim 1883, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by the Fischer Assay.

1919. (previously amended) The method of claim 1883, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heaters are disposed in the formation for each production well.

1920. (previously amended) The method of claim 1883, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, and wherein the unit of heaters comprises a triangular pattern.

1921. (previously amended) The method of claim 1883, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, wherein the unit of heaters comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

1922. (currently amended) A method of treating a hydrocarbon containing formation in situ, comprising:

providing heat from one or more heaters to a part of the formation;

allowing the heat to transfer from one or more heaters to the part of the formation to pyrolyze hydrocarbons within the part of the formation;

wherein at least some hydrocarbons within the part of the formation have an initial atomic hydrogen to carbon ratio greater than about 0.70;

wherein the initial atomic hydrogen to carbon ~~ration~~ ratio is less than about 1.65; and

producing a mixture from the formation.

1923. (previously amended) The method of claim 1922, wherein the one or more heaters comprise at least two heaters, and wherein controlled superposition of heat from at least two heaters pyrolyzes at least some hydrocarbons within the part of the formation.

1924. (previously amended) The method of claim 1922, further comprising maintaining a temperature within the part of the formation within a pyrolysis temperature range.

1925. (currently amended) The method of claim 1922, wherein at least one of the one or more ~~of the~~ heaters ~~comprise~~ comprises an electrical ~~heaters~~heater.

1926. (cancelled)

1927. (currently amended) The method of claim 1922, wherein at least one of the one or more ~~of the~~ heaters ~~comprise~~ comprises a flameless distributed ~~combustors~~combustor.

1928. (currently amended) The method of claim 1922, wherein at least one of the one or more ~~of the~~ heaters ~~comprise~~ comprises a natural distributed ~~combustors~~combustor.

1929. (previously amended) The method of claim 1922, further comprising controlling a pressure and a temperature within at least a majority of the part of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

1930. (previously amended) The method of claim 1922, further comprising controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day during pyrolysis.

1931. (currently amended) The method of claim 1922, wherein providing heat from the one or more ~~of the~~ heaters to at least the portion of the formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from one or more of the heaters, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day (Pwr) provided to the selected volume is equal to or less than $h*V*C_v*\rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

1932. (original) The method of claim 1922, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

1933. (currently amended) The method of claim 1922, wherein providing heat from one or more of the heaters comprises heating the part of the formation ~~such that~~ to increase a thermal conductivity of at least a portion of the part of the formation ~~is~~ to greater than about 0.5 W/(m °C).

1934. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

1935. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

1936. (original) The method of claim 1922, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

1937. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

1938. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

1939. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

1940. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

1941. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

1942. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

1943. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

1944. (original) The method of claim 1922, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

1945. (previously amended) The method of claim 1922, wherein the produced mixture comprises a non-condensable component that does not condense at 25 °C and one atmosphere absolute pressure, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

1946. (original) The method of claim 1922, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

1947. (original) The method of claim 1922, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

1948. (previously amended) The method of claim 1922, further comprising controlling a pressure within at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

1949. (original) The method of claim 1922, further comprising controlling formation conditions to produce the mixture, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

1950. (original) The method of claim 1949, wherein the partial pressure of H_2 within the mixture is measured when the mixture is at a production well.

1951. (original) The method of claim 1922, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

1952. (original) The method of claim 1922, further comprising controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation.

1953. (currently amended) The method of claim 1922, further comprising:

providing hydrogen (H_2) to the heated ~~section~~ part to hydrogenate hydrocarbons within the part of the formation; and

heating a portion of the part of the formation with heat from hydrogenation.

1954. (original) The method of claim 1922, further comprising:

producing hydrogen and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

1955. (currently amended) The method of claim 1922, wherein allowing the heat to transfer ~~comprises increasing~~increases a permeability of a majority of the part of the formation to greater than about 100 millidarcy.

1956. (currently amended) The method of claim 1922, wherein allowing the heat to transfer ~~comprises substantially uniformly increasing~~increases a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform.

1957. (original) The method of claim 1922, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by the Fischer Assay.

1958. (previously amended) The method of claim 1922, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heaters are disposed in the formation for each production well.

1959. (previously amended) The method of claim 1922, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, and wherein the unit of heaters comprises a triangular pattern.

1960. (previously amended) The method of claim 1922, further comprising providing heat from three or more heaters to at least a portion of the formation, wherein three or more of the heaters are located in the formation in a unit of heaters, wherein the unit of heaters comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

Claims 1961-5395 (cancelled)

5396. (previously amended) The method of claim 1919, wherein at least about 20 heaters are disposed in the formation for each production well.

5397. (previously amended) The method of claim 1958, wherein at least about 20 heaters are disposed in the formation for each production well.

5398. (previously added) The method of claim 1883, wherein the part of the formation comprises a selected section.

5399. (previously added) The method of claim 1883, wherein the part of the formation comprises a pyrolysis zone.

5400. (previously added) The method of claim 1883, wherein the part of the formation comprises a pyrolysis zone proximate to and/or surrounding at least one of the heaters.

5401. (previously added) The method of claim 1883, wherein at least one of the heaters is disposed in an open wellbore.

5402. (previously added) The method of claim 1922, wherein the part of the formation comprises a selected section.

5403. (previously added) The method of claim 1922, wherein the part of the formation comprises a pyrolysis zone.

5404. (previously added) The method of claim 1922, wherein the part of the formation comprises a pyrolysis zone proximate to and/or surrounding at least one of the heaters.

5405. (previously added) The method of claim 1922, wherein at least one of the heaters is disposed in an open wellbore.

5406. (currently amended) A method of treating a hydrocarbon containing formation in situ, comprising:

providing heat from one or more heat sources to a part of the formation, wherein the heated part of the formation is proximate the heat sources;

allowing the heat to transfer from the one or more heat sources in the part to a pyrolysis zone to pyrolyze hydrocarbons ~~within~~ in the pyrolysis zone;

wherein at least some hydrocarbons within the pyrolysis zone have an initial atomic hydrogen to carbon ratio greater than about 0.70;

wherein the initial atomic hydrogen to carbon ration is less than about 1.65; and

producing a mixture from the formation.

5407. (previously added) The method of claim 5406, wherein one or more of the heat sources comprise at least two heat sources, and wherein superposition of heat from at least two heat sources pyrolyzes at least some hydrocarbons within the pyrolysis zone.

5408. (previously added) The method of claim 5406, further comprising maintaining a temperature within the pyrolysis zone within a pyrolysis temperature range, wherein the pyrolysis temperature range is from about 250 °C to about 370 °C.

5409. (previously added) The method of claim 5406, further comprising controlling a pressure and a temperature within at least a majority of the pyrolysis zone, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

5410. (previously added) The method of claim 5406, further comprising producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

5411. (previously added) The method of claim 5406, wherein the pyrolysis zone comprises a selected section.

5412. (currently amended) The method of claim 5406, wherein at least one of the heat sources ~~comprise~~ comprises a natural distributed ~~combustors~~combustor.

5413. (previously added) The method of claim 5406, wherein at least one of the heat sources is disposed in an open wellbore.

5414. (currently amended) The method of claim 5406, wherein allowing the heat to transfer ~~comprises substantially uniformly increasing~~increases a permeability of a majority of the pyrolysis zone such that the permeability of the majority of the part is substantially uniform.

5415. (currently amended) The method of claim 5406, wherein providing heat from the one or more ~~of the~~ heat sources to at least the portion of the formation comprises:

heating a selected volume (V) of the coal formation from one or more of the heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day (Pwr) provided to the selected volume is equal to or less than $h*V*Cv*\rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

Response to Final Office Action Mailed January 14, 2003

A. Pending Claims

Claims 1883-1960 and 5397-5415 are currently pending. Claims 1886, 1888, 1889, 1892, 1894, 1916, 1917, 1922, 1925, 1927, 1928, 1931, 1933, 1953, 1955, 1956, 5406, 5412, 5414, and 5415 have been amended. Claims 1887 and 1926 have been cancelled.

B. Double Patenting

The Examiner provisionally rejected claims 1883-1960 and 5397-5415 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims of copending U.S. Patent Application Nos.:

09/840,936; 09/840,937; 09/841,000; 09/841,060; 09/841,061; 09/841,127; 09/841,128; 09/841,129; 09/841,130; 09/841,131; 09/841,170; 09/841,193; 09/841,194; 09/841,195; 09/841,238; 09/841,239; 09/841,240; 09/841,283; 09/841,284; 09/841,285; 09/841,286; 09/841,287; 09/841,288; 09/841,289; 09/841,290; 09/841,291; 09/841,292; 09/841,293; 09/841,294; 09/841,295; 09/841,296; 09/841,297; 09/841,298; 09/841,299; 09/841,300; 09/841,301; 09/841,302; 09/841,303; 09/841,304; 09/841,305; 09/841,306; 09/841,307; 09/841,308; 09/841,309; 09/841,310; 09/841,311; 09/841,312; 09/841,429; 09/841,430; 09/841,431; 09/841,432; 09/841,434; 09/841,435; 09/841,436; 09/841,437; 09/841,438; 09/841,439; 09/841,440; 09/841,441; 09/841,442; 09/841,443; 09/841,444; 09/841,445; 09/841,446; 09/841,447; 09/841,448; 09/841,449; 09/841,488; 09/841,489; 09/841,490; 09/841,491; 09/841,492; 09/841,493; 09/841,494; 09/841,495; 09/841,496; 09/841,497; 09/841,498; 09/841,499; 09/841,500; 09/841,501; 09/841,502; 09/841,632; 09/841,633; 09/841,634, 09/841,635; 09/841,636; 09/841,637; 09/841,638; and 09/841,639.

Applicant respectfully traverses the provisional double patenting rejection. Applicant respectfully submits that the omnibus nature of this rejection does not provide Applicant with sufficient detail in which to address such rejection. Applicant also respectfully submits that the rejection is also inconsistent with certain restrictions issued in the above-referenced cases. Applicant respectfully requests reconsideration.

Pursuant to discussion with the Examiner, for the convenience of the Examiner, Applicant has and will continue to forward copies of allowed claims for the above-referenced cases to the Examiner's Supervisor. Applicant understands that the Examiner's Supervisor will review the allowed claims for the above-referenced cases and then reconsider double patenting rejection in view of the allowed claims.

C. The Claims Are Not Obvious Over Tsai Pursuant to 35 U.S.C. § 103(a)

The Examiner rejected claims 1883-1889, 1893-1906, 1909-1911, 1916-1918, 1922-1928, 1932-1945, 1948, 1949, 1950, 1955-1957, 5398-5401, 5406-5408, and 5410-5414 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,299,285 to Tsai et al. (hereinafter referred to as "Tsai"). Applicant respectfully disagrees that the claims are unpatentable over the cited art.

To reject a claim as obvious, the Examiner has the burden of establishing a *prima facie* case of obviousness. *In re Warner et al.*, 379 F.2d 1011, 154 U.S.P.Q. 173, 177-178 (C.C.P.A. 1967). To establish a prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974); MPEP 2143.03.

The Examiner states, "[t]he Tsai reference teaches a method for treating a hydrocarbon formation in situ comprising providing heat from one or more heaters to a portion of the formation; allowing heat to transfer, and producing a mixture." (Office Action, page 4) Applicant respectfully disagrees.

Claims 1883 and 1922 describe a combination of features including, but not limited to, "providing heat from one or more heaters to at least a portion of the formation" and "allowing the heat to transfer from one or more heaters to a part of the formation". Applicant's Specification states, in part, "A 'heater' is generally defined as any system configured to generate heat in a well

or a near wellbore region." (Applicant's Specification, page 40, lines 6-7) The quoted features of claims 1883 and 1922 do not appear to be taught or suggested by the cited art.

Tsai discloses:

> the injection of air for combustion into the coal bed from one or more injection holes and the production of a combustible gas from one or more production holes. More particularly, this invention relates to a process carried out prior to the combustion and gasification procedure comprising the injection of heated air into the coal bed at sufficient pressure to fracture the coal and provide a link between the injection and production wells. (Tsai, column 1, lines 7-15)

Tsai also teaches injecting air to fracture a coal bed. Tsai discloses, "oxidizing gas is injected into the injection hole at an appropriate rate and the fire is started in the coal bed at the injection well." (Tsai, column 2, lines 32-34) Tsai does not appear to teach heaters as described in the claims.

The Examiner also states:

> Applicant has argued that the Tsai reference fails to teach or suggest "providing heat from one or more heaters to at least a portion of the formation." Applicant also provides text from the specification to support a definition of "heater", which would exclude the fire taught by Tsai. It is noted that applicant's specification also includes much broader definitions of "heater", which include fire [citing Applicant's Specification, page 3, lines 20-28] (Office Action, page 21)

Applicant respectfully disagrees. The words in a claim are generally not limited in their meaning by what is shown or disclosed in the specification. It is when the specification provides definitions for terms appearing in the claims that the specification can be used in interpreting claim language. *In re Vogel*, 422 F.2d 438, 441, 164 U.S.P.Q. 619, 622 (C.C.P.A. 1970); MPEP 2111.01. The Examiner agrees that the "text from the specification...support[s] a definition of 'heater', which would exclude the fire taught by Tsai." (Office Action, page 21) The Examiner states that Applicant's Specification states a broader definition of a heater. Applicant respectfully disagrees with the Examiner's characterization of the Applicant's Specification. The

portion of the Applicant's Specification which the Examiner cited is under the section "Description of the Related Art." The description of the related art describes to the extent practical the state of the prior art or other information disclosed known to the applicant. MPEP 608.01(c). The description of a heater cited from page 40 of the Applicant's Specification is from the Specification section titled "Detailed Description of the Invention." An applicant may be his or her own lexicographer. *In re Hill*, 161 F.2d 367, 73 U.S.P.Q. 482 (C.C.P.A. 1947); MPEP 2111.01. Thus, since the Applicant has described a "heater" at least at page 40 of the Applicant's Specification and the Examiner has agreed that the definition does exclude the method taught by Tsai, Applicant respectfully requests the removal of the rejections to claims 1883 and 1922 and the claims dependent thereon.

Applicant believes that many of the dependant claims are separately patentable.

Claims 1884 and 1923 describe a combination of features including, but not limited to, "wherein the one or more heaters comprise at least two heaters, and wherein controlled superposition of heat from at least two heaters pyrolyzes at least some hydrocarbons within the part of the formation." Applicant submits that the combination of features in claims 1884 and 1923 do not appear to be taught or suggested by the cited art. Applicant requests the removal of the rejections of claims 1883 and 1923.

The Examiner rejected claims 1885 and 1924 stating, "the Tsai reference teaches a pyrolysis temperature range within a section of the formation (see col. 4, line 54)." (Office Action, pages 5 and 14) Applicant respectfully disagrees.

Claims 1885 and 1924 describe a combination of features including, but not limited to, "maintaining a temperature within the part of the formation within a pyrolysis temperature range." Tsai does not appear to teach or suggest maintaining a pyrolysis temperature range within the part of the formation. The Examiner states that Tsai teaches the quoted feature in column 4, line 54. Tsai states, "Some of this may be the result of a minor pyrolysis of the coal. It is believed that the more significant effects are chemical, primarily involving an oxidation of

the coal." (Tsai, column 4, lines 53-56) Applicant respectfully disagrees with the Examiner's characterization of Tsai. Tsai does not appear to teach maintaining a temperature within the part of the formation within a pyrolysis temperature range in the section cited by the Examiner. Thus, since Tsai does not appear to teach or suggest all of the features of claims 1885 and 1924, Applicant respectfully requests removal of the rejections of the claims.

The Examiner states, with regards to claims 1886 and 1925, "electrical heaters are well known to heat air. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used an electrical heater with the Tsai process as called for in claim...in order to heat the air." (Office Action, pages 5 and 14) The Examiner also states, "[w]ith regards to claims 1886 and 1925; in response to the applicant's request for evidence—see applicant's own specification page 4, lines 8-14." (Office Action, page 22) Applicant respectfully disagrees.

The teaching or suggesting to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not the applicant's disclosure. *In re Vaeck*, 947 F.2d 488 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); MPEP 2143. Consequently, the Applicant respectfully disagrees that it would have been obvious to use an electrical heater with the Tsai process. Tsai does not appear to teach, suggest, or provide motivation for "providing heat from one or more heaters to at least a portion of the formation." Applicant respectfully submits that the Examiner's rejection of the features of the claims as obvious matters of choice or design may rely upon personal knowledge of the Examine and therefore Applicant believes MPEP 2144.03 will apply. Pursuant to MPEP 2144.03, Applicant respectfully requests the Examiner to provide support for his assertion either by an affidavit or by reference brought to the Applicant's attention. Otherwise, Applicant requests that the rejections to claims 1886 and 1925 be removed.

The Examiner states with regards to claims 1888 and 1927 "the Tsai reference teaches a flameless combustor (see col. 2, line 32)," and with regards to claims 1889 and 1928, "the Tsai reference teaches a natural distributed combustor. (see col. 2, line 32)." (Office Action, pages 6 and 14) The Examiner further states, "applicant has not provided arguments to show how the

Tsai heater differs from the claimed natural distributed combustor or flameless combustor." (Office Action, page 22) Applicant respectfully disagrees.

Claims 1888 and 1927 describe a combination of features including, but not limited to, "wherein one or more of the heaters comprises a flameless distributed combustor." Applicant's Specification states, in part,

> U.S. Patent Nos. 5,255,742 to Mikus, 5,404,952 to Vinegar et al., 5,862,858 to Wellington et al., and 5,899,269 to Wellington et al., which are incorporated by reference as if fully set forth herein, describe flameless combustors. Flameless combustion may be accomplished by preheating a fuel and combustion air to a temperature above an auto-ignition temperature of the mixture. The fuel and combustion air may be mixed in a heating zone to combust. In the heating zone of the flameless combustor, a catalytic surface may be provided to lower the auto-ignition temperature of the fuel and air mixture. (Applicant's Specification, page 3, line 30 – page 4, line 6)

Tsai does not appear to teach or suggest preheating a fuel and combustion air to a temperature above the auto-ignition temperature of the mixture. Tsai discloses, "[c]ontinued injection of the hot air, heated below the softening temperature of the coal." (Tsai, column 1, lines 15-16). Tsai does not appear to teach or suggest at least the quoted features of claims 1888 and 1927. Applicant respectfully requests that the rejections to claims 1888 and 1927 be removed.

Claims 1889 and 1928 describe a combination of features including, but not limited to, "wherein one or more of the heaters comprises a natural distributed combustor." Applicant's Specification states, in part, "[a]s used herein, the phrase 'natural distributed combustor' generally refers to a heater that uses an oxidant to oxidize at least a portion of the carbon in the formation to generate heat, and wherein the oxidation takes place in a vicinity proximate to a wellbore." (Applicant's Specification, page 40, lines 19-23)

Tsai discloses, "the injection of air for combustion into the coal bed." (Tsai, column 1, lines 7-10) Tsai does not appear to teach oxidation taking place in a vicinity proximate to a wellbore. Tsai discloses, "a low resistance, high porosity route in the coal bed between the

injection hole and the production hole so that large volumes of oxidizing gas, generally air...can be introduced into the coal deposition at low pressure to support substantial combustion and concurrently deliver large volumes of...product." (Tsai, column1, lines 52-59) Therefore, Tsai does not appear to teach at least the quoted features of claims 1889 and 1928. Applicant respectfully requests removal of the rejections of the claims.

The Examiner states in regards to claims 1893 and 1932:

> the Tsai reference does not explicitly teach the transferring by conduction; however this is inherent in a solid substance such as coal. Even though the bulk of the heating in the Tsai method may be done by convection; it is apparent that some unfractured coal must remain, and thus allowing heat to transfer comprises transferring heat substantially by conduction (that is, substantially within the unfractured portions)." (Office Action, pages 6 and 15)

The Examiner also states "[i]t should be abundantly clear that heat transfer in a solid substance such as coal inherently includes conduction." Applicant respectfully disagrees.

Claims 1893 and 1932 describe a combination of features including, but not limited to, "wherein allowing the heat to transfer comprises transferring heat substantially by conduction." The Examiner states that "the bulk of the heating in the Tsai method may be done by convection." (Office Action, page 6) "Substantially" is defined as "largely; essentially; in the main." *Webster's New Twentieth Century Dictionary Unabridged, 2nd ed.* Tsai appears to teach the bulk of heating by convection. Since Tsai teaches largely or essentially heating by convection, the Tsai method appears to teach away from heating substantially by conduction. Therefore, Tsai does not appear to teach or suggest all the features of claims 1893 and 1932. Applicant respectfully requests that the rejection be removed.

The Examiner rejected claims 1894 and 1933 stating:

> the Tsai reference does not teach the thermal conductivity; however, it would have been further obvious to one of ordinary skill in the art at the time of the invention to have practiced the Tsai method in a coal seam having a thermal conductivity of greater than about 0.5W/(m°C)...such a

> formation would be a desirable choice because it would heat more uniformly." (Office Action, pages 6 and 15)

The Examiner further states, "in response to applicant's request for evidence—see "Coal: Typology-Physics-Chemistry-Constitution"; in particular pages 526 and 527; which shows most coal having a thermal conductivity above 0.5 W/m°C." (Office Action, page 22) Applicant respectfully disagrees.

Claims 1894 and 1933 describe a combination of features including, but not limited to, "wherein providing heat from one or more of the heaters comprises heating the part of the formation to increase a thermal conductivity of at least a portion of the part of the formation to greater than about 0.5 W/(m °C)." For at least the reasons previously mentioned, the combination of features in claim 1894 and 1933 do not appear to be taught or suggested by the cited art. Applicant requests the removal of the rejection of the claims.

The Examiner states with regards to claims 1895-1906, 1910, 1911, 1934-1945, 1949, and 1950, "the nature of hydrocarbons produced from such heating is highly variable, and dependent upon many factors, not least of which is the characteristics of coal. The components of the produced mixture are deemed to be the results of design variables, including coal characteristics and temperature." (Office Action, pages 6 and 15) The Examiner also states, "[w]ith further regards to applicant's request for a reference (as per MPEP 2144.03); applicant has not specifically pointed out what facts are at issue, however the attached pages from 'Coal: Typology-Physics-Chemistry-Constitution' provide evidence that coal is highly variable." (Office Action, page 23) Applicant respectfully disagrees.

Tsai discloses:

> Upon heating a swellable bituminous coal without combustion, it will soften, as stated, at a rather well defined temperature, designated its softening temperature behaving like a plastic material within a plastic temperature range. Pyrolysis of the softened coal and the formation of bubbles within the plastic mass causes the swelling of the coal. Continued pyrolysis for a period of time causes a resolidification of the coal at a greater

> volume than the original coal. This softening, expansion and resolidification, as briefly mentioned herein, is the process by which the air channels or links in swellable coal are blocked at the high temperatures involved during in situ gasification. (Tsai, column 4, lines 14-26)

Tsai also discloses, "The net result is a combustible product gas comprising carbon monoxide, hydrogen and some methane as its principal combustibles and having a heat content which depends on many factors including whether supplemental oxygen and/or water are added to the oxidizing gas." (Tsai, column 5, line 55-column 6, line 1)

Applicant's specification states:

> One or more heat sources may be used to heat a portion of the hydrocarbon containing formation to temperatures that allow pyrolysis of the hydrocarbons. Hydrocarbons, hydrogen, and other formation fluids may be removed from the formation through one or more production wells. The formation fluids may be removed in a vapor phase. Temperature and pressure in at least a portion of the formation may be controlled during pyrolysis to yield improved products from the formation. (Applicant's Specification, page 10, lines 6-11)

Applicant submits that the product mixtures recited in claims 1895-1906, 1910, 1911, 1934-1945, 1949, and 1950 would not be producible by carrying out the in situ combustion process of Tsai. The product mixtures recited in claims 1895-1906, 1910, 1911, 1934-1945, 1949, and 1950 may be produced by controlling and/or modifying formation conditions during treatment to produce the selected results recited in the claims.

Claims 1911 and 1950 describe a combination of features including, but not limited to, "wherein the partial pressure of H_2 within the mixture is measured when the mixture is at the production well." For at least the reasons previously mentioned, the cited art does not appear to teach or suggest the combination of features in claims 1911 and 1950. Applicant requests that the removal of the rejections of claims 1911 and 1950.

The Examiner states with regards to claims 1909 and 1948, "the Tsai reference teaches the pressure greater than 2.0 bar." Applicant respectfully disagrees that the claims are

unpatentable over the cited art. For at least the reasons stated above, the cited art does not teach or suggest the combination of features of claims 1909 and 1948. Applicant requests the removal of the rejections of claims 1909 and 1948.

The Examiner rejected claims 1916, 1917, 1955 and 1956 stating, "the Tsai reference teaches the permeability greater than about 100 md in table 1." (Office Action, pages 7 and 16) The Examiner further states, "applicant has failed to provide any evidence that the uniform increase of permeability is not inherent. MPEP does not apply because Tsai clearly teaches increasing the permeability." (Office Action, page 23) Applicant respectfully disagrees.

Permeabilities recorded in Table I of Tsai do not appear to be substantially uniform. Tsai states: "The initial permeability of the core was 2.0, after two days it was 27.5, after three days it was 77.2 and after four days it was 107 as reported in Table I." (Tsai, column 7, lines 11-14). In addition, Table I of Tsai discloses a permeability of 107 md for Ex. 6 and a permeability of 148 md for Ex. 7, in which the axis of the core was perpendicular to the bedding plane.

Tsai also states: "It should be appreciated that the coal, following the pretreatment and conditioning procedure, will exhibit a zone of increasing free swelling index and a decreasing permeability in a direction away from the fracture-induced linkage until non-affected coal is reached." (Tsai, column 5, lines 32-37)

Tsai does not appear to teach or suggest at least the above-quoted features of the claims. Applicant submits at least the above-quoted features of claims 1916-1917 and 1955-1956, in combination with other features of the claims, do not appear to be taught or suggested by the cited art.

The Examiner states with regards to claim 1918 and 1957, "although the Tsai reference fails to explicitly disclose a Fisher Assay; it is apparent that the disclosed process will yield greater than 60%." (Office Action, pages 7 and 16) The Examiner also states, "applicant has not shown any evidence that the volatile content of coal is the same as the yield. Note that since the

volatile content is reported along with ash content, it clearly cannot be equated to yield. With regards to applicant's assertion that MPEP 2144.03 applies to this rejection; examiner has asserted that the yield is inherent; burden is on applicant to show that it is not inherent." (Office Action, page 23) Applicant respectfully disagrees.

Claims 1918 and 1957 describe a combination of features including, but not limited to, "controlling the heat to yield greater than about 60% by weight of condensable hydrocarbons, as measured by the Fischer Assay." Applicant's Specification states, in part:

> Each of the hydrocarbon containing layers may also have a potential formation fluid yield that may vary depending on, for example, conditions under which the hydrocarbon containing layer was formed, an amount of hydrocarbons in the layer, and/or a composition of hydrocarbons in the layer. A potential formation fluid yield may be measured, for example, by the Fischer Assay. The Fischer Assay is a standard method which involves heating a sample of a hydrocarbon containing layer to approximately 500 °C in one hour, collecting products produced from the heated sample, and quantifying the amount of products produced. A sample of a hydrocarbon containing layer may be obtained from a hydrocarbon containing formation by a method such as coring or any other sample retrieval method. (Applicant's Specification, page 56, lines 4-13)

Tsai does not appear to teach or suggest the feature of controlling the heat to produce a yield, as measured by Fischer Assay and taught by the Applicant's Specification. The Examiner states, "applicant has not shown any evidence that the volatile content of coal is the same as the yield. Note that since the volatile content is reported along with ash content, it clearly cannot be equated to yield." Applicant submits that evidence that the volatile content of coal is the same as the yield is not necessary. Claims 1918 and 1957 feature, in part, a "yield ...as measured by the Fischer Assay."

Applicant submits that controlling heat to yield, as measured by Fischer Assay, greater than about 60% by weight of condensable hydrocarbons in combination with the other features of claims 1918 and 1957 are not inherent. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however,

may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted); MPEP 2122). Applicant submits that the cited art does not teach or suggest the combination of features in claims 1918 and 1957. Applicant respectfully requests removal of the rejections of claims 1918 and 1957.

The Examiner states, "[w]ith regards to claims 5398; it is apparent that Tsai anticipates a selected section. With regards to claim 5399; Tsai also teaches a pyrolysis zone." (Office Action, page 7) For at least the reasons previously stated, the cited art does not appear to teach or suggest all the features of claims 5398 and 5399. Applicant requests that the rejection to claims 5398 and 5399 be removed.

The Examiner states, "[w] ith regards to claim 5400; Tsai also teaches a pyrolysis zone proximate at least one heater." (Office Action, page 7) Applicant respectfully disagrees that the claim is unpatentable over the cited art.

Claim 5400 includes a combination of features including, but not limited to the feature of "wherein the part of the formation comprises a pyrolysis zone proximate to and/or surrounding at least one of the heaters." Tsai does not appear to teach or suggest at least the quoted feature of the claim.

The Examiner states, "[w]ith regards to claim 5401; Tsai fails to explicitly disclose the open wellbore, however the wellbore must be open, otherwise the air would not flow into the formation." (Office Action, page 7) Applicant respectfully disagrees that the claim is unpatentable over the cited art.

Claim 5401 describes a combination of features including, but not limited to, "wherein at least on of the heaters is disposed in an open wellbore." Applicant's Specification states, in part, "a heat source may be placed in an open wellbore in the formation. In this manner, heat may conductively and radiatively transfer from the heat source to the formation. Applicant's

Specification also states, in part, "The term 'wellbore' generally refers to a hole in a formation made by drilling." (Applicant's Specification, page 40, line 13) Tsai does not appear to teach or suggest a heater in an open wellbore as described in claim 5401. Applicant respectfully requests that the rejection to claim 5401 be removed.

The Examiner states, "[r]egarding independent claim 5406: The Tsai reference teaches a method for treating a hydrocarbon formation in situ comprising providing heat from one or more heat sources to a part of the formation; and allowing heat to transfer." (Office Action, page 7) Applicant respectfully disagrees that the claim is unpatentable over the cited art.

Claim 5406 describes a combination of features including, but not limited to, "providing heat from one or more heat sources to a part of the formation, wherein the heated part of the formation is proximate the heat sources" and "allowing the heat to transfer from the one or more heat sources in the part to a pyrolysis zone to pyrolyze hydrocarbons in the pyrolysis zone." Tsai does not appear to teach or suggest at least the above-quoted features of claim 5406. Tsai discloses, "oxidizing gas is injected into the injection hole at an appropriate rate and the fire is started in the coal bed at the injection well." (Tsai, column 2, lines 32-34) Tsai does not appears to teach providing heat from one or more heat sources to a part of the formation, where the heated part of the formation is proximate the heat sources and allowing the heat to transfer from one or more heat sources to a pyrolysis zone to pyrolyze hydrocarbons in the pyrolysis zone. Since Tsai does not appear to teach or suggest all the features of claim 5406, Applicant requests that the rejection to claim 5406 be removed.

Claim 5407 describes a combination of features including, but not limited to, "wherein one or more of the heat sources comprise at least two heat sources, and wherein superposition of heat from at least two heaters pyrolyzes at least some hydrocarbons within the pyrolysis zone." Applicant submits that the combination of features in claim 5407 does not appear to be taught or suggested by the cited art. Applicant requests removal of the rejection of claim 5407.

The Examiner states, "[w]ith regards to claims 5408; the Tsai reference teaches a pyrolysis temperature range within a section of the formation (see col. 4, line 54)." (Office Action, page 8) Applicant respectfully disagrees that the claim is unpatentable over the cited art.

Claim 5408 describes a combination of features including, but not limited to, "maintaining a temperature within the pyrolysis zone within a pyrolysis temperature range, wherein the pyrolysis temperature range is from about 250 °C to about 370 °C." Tsai appears to teach controlling the injection air temperature. Tsai states, "[t]he temperature of the heated air should be at least about 150 °C. and preferably at least about 150 °C." (Tsai, column 3, lines 27-28) Applicant submits that the cited art does not appear to teach or suggest all the features of claim 5408. Applicant respectfully requests removal of the rejection of claim 5408.

Claim 5410 describes a combination of features including, but not limited to, "producing a mixture from the formation, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°." Applicant submits the cited art does not appear to teach or suggest the combination of features in claim 5410.

Claim 5411 describes a combination of features including, but not limited to, "wherein the pyrolysis zone comprises a selected section." For at least the reasons previously mentioned, Applicant submits that the combination of features in claim 5411 do not appear to be taught or suggested by the cited art.

Claim 5412 describes a combination of features including, but not limited to, "wherein at least one of the heat sources comprises a natural distributed combustor." For at least the reasons previously mentioned, Tsai does not appear to teach or suggest the use of natural distributed combustors in combination with the other features of claim 5412. Applicant requests the rejection of claim 5412 be removed.

Claim 5413 describes a combination of features including but not limited to, "wherein at least one of the heat sources is disposed in an open wellbore" For at least the reasons previously

stated, the cited art does not appear to teach or suggest the features of claim 5413. Applicant requests the removal of the rejection to claim 5413.

Claim 5414 includes a combination of features including but not limited to the feature of "wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the pyrolysis zone." For at least the reasons previously mentioned, Applicant submits that the combination of features in claim 5414 does not appear to be taught or suggested by the cited art.

D. The Claims Are Not Obvious Over Tsai In View of Elkins Pursuant to 35 U.S.C. § 103(a)

The Examiner rejected claims 1890, 1929, and 5409 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,299,285 to Tsai et al. (hereinafter referred to as "Tsai") in view of U.S. Patent No. 2,734,579 to Elkins (hereinafter referred to as "Elkins"). Applicant disagrees that the claims are unpatentable over Tsai in view of Elkins.

Applicant submits that for at least the reasons set forth above, the combination of features in claim 1890, 1929, and 5409 are not obvious. Applicant submits that claims 1890, 1929, and 5409 are separately patentable over the cited art and Applicant respectfully requests removal of the rejections of claims 1890, 1929, and 5409.

E. The Claims Are Not Obvious Over Tsai In View of Kasevich Pursuant to 35 U.S.C. § 103(a)

The Examiner rejected claims 1891, 1892, 1930, 1931, and 5415 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,299,285 to Tsai et al. (hereinafter referred to as "Tsai") in view of U.S. Patent No. 4,457,365 to Kasevich (hereinafter referred to as "Kasevich"). Applicant disagrees that the claims are unpatentable over Tsai in view of Kasevich.

Claims 1891 and 1930 include a combination of features including, but not limited to the feature of "controlling the heat such that an average heating rate of the part of the formation is less than about 1 °C per day during pyrolysis." Claims 1892, 1931, and 5415 include a combination of features including, but not limited to the features of "wherein heating energy/day (Pwr) provided to the selected volume is equal to or less than $h*V*Cv*\rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day."

Kasevich states: "this invention provides for heating kerogen in oil shale with electric fields having frequency components in the range between 100 kilohertz and 100 megahertz where dry oil shale is selectively heated, with kerogen-rich regions absorbing energy from said fields at substantially higher rates than kerogen-lean regions." (Kasevich, column 2, lines 9-15)

Tsai states: "This invention relates to the in situ combustion and gasification of a swelling bituminous coal by the injection of air for combustion into the coal bed from one or more injection holes and the production of a combustible gas from one or more production holes." (Tsai, column 1, lines 6-10)

Obviousness can only be established by "showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teaching of the references." *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Applicant respectfully submits that the features of the electric field heating method of Kasevich for an oil shale formation would not be suitable for modifying the in situ combustion process of Tsai for a coal formation to produce the features described in claims 1891, 1892, 1930, 1931, and 5415.

F. <u>The Claims Are Not Obvious Over Tsai In View of Stoddard Pursuant to 35 U.S.C. § 103(a)</u>

The Examiner rejected claims 1907, 1908, 1946, and 1947 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,299,285 to Tsai et al. (hereinafter referred to as "Tsai") in view of U.S. Patent No. 4,463,807 to Stoddard et al. (hereinafter referred to as "Stoddard"). Applicant disagrees that the claims are unpatentable over Tsai in view of Stoddard.

Claims 1907 and 1946 include a combination of features including, but not limited to the feature of "wherein the produced mixture comprises ammonia, and wherein the greater than about 0.05% by weight of the produced mixture is ammonia." Applicant submits that the above-quoted features of the claims do not appear to be taught or suggested by the cited art.

Claims 1908 and 1947 include a combination of features including, but not limited to the features of "wherein the produced mixture comprises ammonia" and "wherein the ammonia is used to produce fertilizer." The features of the claims do not appear to be taught or suggested by the cited art.

G. The Claims Are Not Obvious Over Tsai In View of Gregoli Pursuant to 35 U.S.C. § 103(a)

The Examiner rejected claims 1912-1915 and 1951-1954 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,299,285 to Tsai et al. (hereinafter referred to as "Tsai") in view of U.S. Patent No. 6,016,867 to Gregoli (hereinafter referred to as "Gregoli"). Applicant disagrees that the claims are unpatentable over Tsai in view of Gregoli.

The Examiner states:

> "the Gregoli reference teaches that in a similar in-situ processes, it is beneficial to use high pressure to break heavy hydrocarbons. It is well know that carbons having carbon numbers greater than about 25 are considered to be heavy; and impede production because they are dense and viscous. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the Tsai method to have included altering pressure to inhibit production of hydrocarbons having carbon numbers greater than about 25." (Office Action, pages 11 and 18)

The Examiner also states, "Applicant's assertion that the Gregoli process of converting high molecular weight hydrocarbons...into lower weight does not anticipate 'to inhibit production...having carbon numbers greater than about 25' is simply not persuasive." (Office Action, page 24) Applicant respectfully disagrees that the claims are unpatentable over the cited art.

Claims 1912 and 1951 describe a combination of features including, but not limited to, "altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25. " Tsai does not appear to teach or suggest at least the quoted features of the claims. Gregoli discloses, "conditions necessary for sustaining the hydrovis-breaking reaction are achieved by injecting superheating steam and hot reducing gases, comprised principally of hydrogen, to heat the formation to a preferred temperature and to maintain a preferred level of hydrogen partial pressure." Gregoli appears to teach the use of steam and a reducing gas for "hydrovis-breaking reactions". Gregoli does not appear to teach inhibiting production of hydrocarbons having carbon numbers greater than about 25 by altering pressure within the formation. Applicant requests that the rejections to claims 1912 and 1951 be removed.

Claims 1913 and 1952 describe a combination of features including, but not limited to, "controlling formation conditions by recirculating a portion of hydrogen from the mixture into the formation." Tsai does not appear to teach or suggest the quoted feature in combination with the other features of claims 1913 and 1952. Gregoli does not appear to teach or suggest recirculating a portion of hydrogen from the mixture into the formation. Applicant respectfully requests removal of the rejections to claims 1913 and 1952.

Claims 1914 and 1953 describe a combination of features including, but not limited to, "providing hydrogen...to the heated part of the formation to hydrogenate hydrocarbons within the part of the formation; and heating a portion of the part of the formation with heat from

hydrogenation." The combination of features in claims 1914 and 1953 do not appear to be taught or suggested by the cited art. Applicant requests the removal of the rejection of claim 1914.

Claims 1915 and 1954 describe a combination of features including, but not limited to the feature of "hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen." The combination of features in claims 1915 and 1954 do not appear to be taught or suggested by the cited art. Applicant requests the removal of the rejections of claims 1915 and 1954.

H. The Claims Are Not Obvious Over Tsai In View of Van Meurs Pursuant to 35 U.S.C. § 103(a)

The Examiner rejected claims 1919-1920, 1958-1959, and 5396-5397 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,299,285 to Tsai et al. (hereinafter referred to as "Tsai") in view of U.S. Patent No. 4,886,118 to Van Meurs et al. (hereinafter referred to as "Van Meurs"). Applicant disagrees that the claims are unpatentable over Tsai in view of Van Meurs.

For at least the reasons previously mentioned, the combination of features in claims 1919-1919-1920, 1958-1959, and 5396-5397 do not appear to be taught or suggested by the cited art. Applicant requests the removal of the rejections of claims 1919-1920, 1958-1959, and 5396-5397.

I. The Claims Are Not Obvious Over Tsai In View of Van Meurs And In Further View of Salomonsson Pursuant to 35 U.S.C. § 103(a)

The Examiner rejected claims 1921 and 1960 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,299,285 to Tsai et al. (hereinafter referred to as "Tsai") in view of U.S. Patent No. 4,886,118 to Van Meurs et al. (hereinafter referred to as "Van Meurs") and in further view of U.S. Patent No. 2,914,309 to Salomonsson (hereinafter referred to as